THAT WHICH IS CLAIMED IS:

1. A fingerprint sensor comprising:

a substrate;

a plurality of semiconductor devices adjacent said substrate and defining active circuit portions;

a first metal layer interconnecting predetermined ones of said plurality of semiconductor devices;

a first dielectric layer adjacent said first metal layer;

a second metal layer adjacent said first dielectric layer defining a ground plane;

a second dielectric layer adjacent said second metal layer; and

a third metal layer adjacent said second dielectric layer and comprising an array of electric field sensing electrodes connected to active circuit portions for generating signals related to a sensed fingerprint.

2. A fingerprint sensor according to Claim 1 further comprising a third dielectric layer ~~adjacent~~ said third metal layer.

3. A fingerprint sensor according to Claim 1 further comprising a package surrounding said substrate and having an opening aligned with the array of electric field sensing electrodes.

4. A fingerprint sensor according to Claim 3 further comprising a first external electrode carried by said package for contact by a finger.

5. A fingerprint sensor according to Claim 4 further comprising excitation drive means connected between the ground plane and said first external

electrode for generating electric fields between the electric field sensing electrodes and adjacent finger portions.

6. A fingerprint sensor according to Claim 4 further comprising power control means for controlling operation of active circuit portions based upon sensing finger contact with said first external electrode.

7. A fingerprint sensor according to Claim 6 wherein said power control means comprises wake-up means for only powering active circuit portions upon sensing finger contact with said first external electrode to thereby conserve power.

8. A fingerprint sensor according to Claim 6 wherein said power control means further comprises protection means for grounding active circuit portions upon not sensing finger contact with said first external electrode.

9. A fingerprint sensor according to Claim 3 further comprising finger charge bleed means for bleeding a charge from a finger upon contact therewith.

10. A fingerprint sensor according to Claim 9 wherein said finger charge bleed means comprises:

a second external electrode carried by said package for contact by a finger;

a charge bleed resistor connected between said second external electrode and an earth ground.

11. A fingerprint sensor according to Claim 10 wherein said second external electrode comprises an electrically conductive movable cover for the opening in said package.

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12. A fingerprint sensor according to Claim 1 further comprising:

a shield electrode adjacent each electric field sensing electrode; and

an amplifier having an input connected to each electric field sensing electrode, and having an output connected to each respective shield electrode, said amplifier having an amplification gain greater than about one to thereby increase noise rejection.

13. A fingerprint sensor comprising:

a substrate;

a plurality of semiconductor devices adjacent said substrate and defining active circuit portions for generating an output related to a sensed fingerprint;

a package surrounding said substrate;

a first external electrode carried by said package for contact by a finger; and

power control means for controlling operation of active circuit portions based upon sensing finger contact with said first external electrode.

14. A fingerprint sensor according to Claim 13 further comprising at least one conductive layer comprising an array of electric field sensing electrodes connected to active circuit portions.

15. A fingerprint sensor according to Claim 14 further comprising excitation drive means connected to said first external electrode for generating electric fields between the electric field sensing electrodes and adjacent finger portions.

16. A fingerprint sensor according to Claim 13 wherein said power control means comprises wake-up means for only powering active circuit portions upon

sensing finger contact with said first external electrode to thereby conserve power.

17. A fingerprint sensor according to Claim 13 wherein said power control means further comprises protection means for grounding active circuit portions upon not sensing finger contact with said first external electrode.

18. A fingerprint sensor according to Claim 17 further comprising finger charge bleed means for bleeding a charge from a finger upon contact therewith, and wherein said finger charge bleed means and said protection means cooperate so that active circuit portions remain grounded until said bleed means bleeds the charge from the finger.

19. A fingerprint sensor according to Claim 18 wherein said finger charge bleed means comprises:

a second external electrode carried by said package for contact by a finger; and

a charge bleed resistor connected between said second external electrode and an earth ground.

20. A fingerprint sensor according to Claim 19 wherein said second external electrode comprises an electrically conductive movable cover for said package.

21. A fingerprint sensor according to Claim 19 wherein said at least one conductive layer comprises a ground plane layer connected to said charge bleed resistor.

22. A fingerprint sensor comprising:

a substrate;

a plurality of semiconductor devices adjacent said substrate and defining active circuit portions for generating an output related to a sensed fingerprint;

a package surrounding said substrate; and

finger charge bleed means for bleeding a charge from a finger upon contact therewith to protect the active circuit portions.

23. A fingerprint sensor according to Claim 22 wherein said finger charge bleed means comprises:

a second external electrode carried by said package for contact by a finger; and

a charge bleed resistor connected between said second external electrode and an earth ground.

~~24~~ 23. A fingerprint sensor according to Claim ~~23~~ 22 wherein said second external electrode comprises an electrically conductive movable cover for said package.

~~25~~ 24. A fingerprint sensor according to Claim 22 further comprising at least one conductive layer comprising an array of electric field sensing electrodes connected to the active circuit portions.

~~26~~ 25. A fingerprint sensor according to Claim ~~25~~ 24 further comprising:

a first external electrode carried by said package; and

excitation drive means connected to said first external electrode for generating electric fields between the electric field sensing electrodes and adjacent finger portions.

~~27~~ 26. A fingerprint sensor comprising:

a substrate;

at least one electrically conductive layer adjacent said substrate and comprising portions

defining an array of pairs of electric field sensing electrodes and associated shield electrodes; and

a respective amplifier connected between each pair of electric field sensing electrodes and associated shield electrodes, each amplifier having an amplification gain greater than about one to thereby increase noise rejection.

28. A fingerprint sensor according to Claim 27 wherein each amplifier has an input connected to each electric field sensing electrode and has an output connected to each respective shield electrode.

29. A fingerprint sensor according to Claim 27 further comprising a plurality of semiconductor devices adjacent said substrate and defining the amplifiers.

30. A method for making a fingerprint sensor comprising the steps of:

forming a plurality of semiconductor devices adjacent a substrate and defining active circuit portions;

forming a first metal layer interconnecting predetermined ones of the plurality of semiconductor devices;

forming a first dielectric layer adjacent the first metal layer;

forming a second metal layer adjacent the first dielectric layer defining a ground plane;

forming a second dielectric layer adjacent the second metal layer; and

forming a third metal layer adjacent the second dielectric layer and comprising an array of electric field sensing electrodes connected to active circuit portions for generating signals related to a sensed fingerprint.

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~~31~~. A method according to Claim ~~30~~ further comprising the step of forming a third dielectric layer ~~adjacent~~ the third metal layer.

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~~32~~. A method according to Claim ~~30~~ further comprising the step of forming a package surrounding the substrate and having an opening aligned with the array of electric field sensing electrodes.

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~~33~~. A method according to Claim ~~32~~ further comprising the step of forming a first external electrode carried by the package for contact by a finger.

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~~34~~. A method according to Claim ~~32~~ further comprising the steps of:

forming a second external electrode carried by the package for contact by a finger; and

connecting a charge bleed resistor between the second external electrode and an earth ground.

35. A method for controlling operation of a fingerprint sensor of a type comprising a plurality of semiconductor devices adjacent a substrate and defining active circuit portions for generating an output related to a sensed fingerprint, a package surrounding the substrate, and a first external electrode carried by the package for contact by a finger, the method comprising the steps of:

only powering active circuit portions upon sensing finger contact with the first external electrode to thereby conserve power; and

grounding active circuit portions upon not sensing finger contact with the first external electrode.

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36. A method according to Claim 35 further comprising the step of bleeding a charge from the finger upon initial contact of the finger with the fingerprint package and before switching from grounding of the active circuit portions to powering same.

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37. A method of increasing noise rejection in a fingerprint sensor of a type comprising a substrate, and at least one electrically conductive layer adjacent said substrate and comprising portions defining an array of electric field sensing electrodes, the method comprising the steps of:

forming a shield electrode for each respective electric field sensing electrode;

forming a respective amplifier connected between each pair of electric field sensing electrodes and associated shield electrodes; and

operating each amplifier at an amplification gain greater than about one to thereby increase noise rejection.